What is claimed is:

1. A method of introducing a pilot fuel into a cylinder of an operating internal combustion engine, said engine having a piston disposed within said cylinder, said method comprising:

(a) monitoring a set of engine parameters;

(b) determining engine load and engine speed from said set of engine parameters;

(b) introducing a first quantity of a first gaseous fuel into said cylinder and an intake charge into said cylinder;

(c) at a pilot fuel timing, introducing a pilot fuel quantity of said pilot fuel at said pilot fuel timing into said cylinder so that it ignites when said piston is at or near top dead centre of the compression stroke, said pilot timing avoiding a excessive knocking range during a compression stroke of said engine;

wherein said first quantity and said pilot fuel quantity and said pilot fuel timing are controllable in response to at least one of engine load and engine speed, said first quantity forming a premixed charge of fuel and air prior to ignition of said pilot fuel.

2. The method of claim 1 wherein said excessive knocking range is between 50 and 30 crank angle degrees before top dead center during said compression stroke.

3. The method of claim 1 further comprising directly injecting a second quantity of a second gaseous fuel into said combustion chamber when said piston is at or near top dead center wherein within the same engine cycle, said first gaseous fuel combusts according to a pre-mixed combustion mode and said second gaseous fuel combusts substantially according to a diffusion combustion mode.

4. The method of claim 3 wherein said pre-mixed combustion mode is a homogeneous charge compression ignition mode.

5. The method of claim 1 wherein said engine is a four-stroke engine.

6. The method of claim 1 wherein said first gaseous fuel is pre-mixed with said intake charge prior to being introduced into said cylinder.

7. The method of claim 1 wherein said set of engine parameters comprises at least one of engine speed, engine throttle position, intake manifold temperature, intake manifold pressure, exhaust gas recirculation flow rate and

temperature, air flow into said cylinder, compression ratio, intake and exhaust valve timing, the presence or absence of knocking within said cylinder, and one of the start of combustion, heat release rate and pressure trance determined from a previous cycle of said engine.

8. The method of claim 2 wherein said pilot fuel timing is after said piston passes 120 crank angle degrees before top dead center of the compression stroke.

9. The method of claim 1 wherein said amount of said pilot fuel is dependent on a signal capable of being used to estimate start of combustion of said gaseous fuel during a previous cycle of said engine.

10. The method of claim 1 further comprising identifying an low load operating mode and a high load operating mode for said engine, wherein said pilot fuel timing is a late timing in said low load operating mode and said pilot fuel timing is an early timing in said high load operating mode.

11. The method of claim 10 wherein said early timing is prior to said excessive knocking range and said late timing after said excessive knocking range.

12. The method of claim 11 further comprising identifying a transition operating mode for said engine wherein said engine transitions between said low load operating mode and said high load operating mode.

13. The method of claim 12 wherein said transition operating mode transitions said pilot timing between said late timing and said early timing by jumping said excessive knocking range between successive cycles of said engine.

14. The method of claim 12 wherein said transition operating mode comprises, within a cycle of said engine, at least two pilot fuel injections, a first pilot fuel injection prior to said excessive knocking range and a second pilot fuel injection after said excessive knocking range.

15. The method of claim 1 further comprising changing at least one of said pilot fuel quantity and pilot fuel timing when knocking is detected.

16. The method of claim 1 wherein said pilot fuel is selected from the group consisting of diesel fuel and dimethylether.

17. The method of claim 1 wherein said pilot fuel is mixed with said first gaseous fuels and introduced into said cylinder together with said first gaseous fuel.

18. The method of claim 3 wherein said first and second gaseous fuels are the same gaseous fuel.

19. The method of claim 1 wherein said first gaseous fuel comprises at least one of natural gas, liquefied petroleum gas, bio-gas, landfill gas, and hydrogen gas.

20. An apparatus for introducing fuel into the cylinder of an operating internal combustion engine having at least one cylinder with a piston disposed therein, said fuel comprising a main fuel and a pilot fuel that is auto-ignitable to a degree greater than said main fuel, said apparatus comprising:

(a) measuring devices for collecting operational data from said engine, said measuring devices comprising a tachometer for measuring engine speed and a sensor for determining throttle position;

(b) an electronic control unit that receives said operational data and processes said data to compute a set of load conditions, said electronic control unit comprising memory for

storing control sets of load conditions and predetermined operating modes for said control sets of load conditions, said electronic control unit matching said computed set of load conditions with said control sets of load conditions to select one of a plurality of predetermined operating modes;

(c) a main fuel introduction system controlled by said electronic control unit to introduce said main fuel into said cylinder at times and in quantities determined by said electronic control unit in accordance with said predetermined operating modes and said set of load conditions; and

(d) a pilot fuel injection valve controlled by said electronic control unit to introduce said pilot fuel into said cylinder at times and in quantities determined by said electronic control unit with said predetermined operating modes and said set of load conditions;

wherein said predetermined operating mode comprises a two stage introduction of fuel into said cylinder, whereby a first portion of said main fuel is introduced in a first stage to provide for a premixed fuel/air charge prior to combustion of said pilot fuel and said pilot fuel is introduced in a second stage, said controller

and said pilot fuel injection valve capable of detecting and avoid an excessive knocking range for introduction of said pilot fuel.

21. The apparatus of claim 20 wherein said main fuel introduction system comprises an main fuel injection valve.

22. The apparatus of claim 21 wherein said main fuel injection valve and said pilot fuel injection valve are integrated into a dual fuel injection valve that is operable to inject each one of said main fuel and said pilot fuel independently from the other.

23. The apparatus of claim 20 wherein said main fuel introduction system comprises an auxiliary injection valve associated with an air induction system for introducing said main fuel into an air induction passage so that said main fuel is capable of mixing with intake air prior to being introduced to said cylinder.

24. The apparatus of claim 23 wherein said air induction passage is an air induction manifold.